

**New Variance**  
**Guidelines for Small Diameter**  
**Wells**  
**in**  
**San Diego County**

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# Limitation of Current Standards

## B. Standards, 1. Well Construction

f. The following are minimum boring diameters for the respective casing sizes:

<u>Casing I.D.</u>	<u>Minimum Boring Diameter</u>
2 inches	6 inches
4 inches	8 inches
6 inches	10 inches

In general, casing sizes must have a minimum borehole diameter 4 inches greater than the proposed casing.

# **Small Diameter Well**

Is a well with a borehole diameter of less than 6 inches and an annular space around the casing of less than 2 inches that cannot be constructed using conventional drilling methods.

# **VARIANCE**

The installation of small diameter wells shall follow all sections of:

- **The San Diego County Well and Boring Construction Standards in Appendix B.IV.B.**
- **The California Department of Water Resources Bulletins 74-81 and 74-90**

Specific variances are allowed and are outlined in Appendix B.IV.D.

# VARIANCE

- The installation of a small diameter well is a “variance” from the standards
- Requires you to answer “YES” to Question 9 on the Permit application.
- Details must be provided on the site geology, hydrogeology and well design.

# Site Selection

- The site must have favorable geologic and hydrologic conditions.
- The subsurface geology must be sufficiently understood prior to mobilizing.
- The water table elevation at the site must be sufficiently understood.

# Well Design

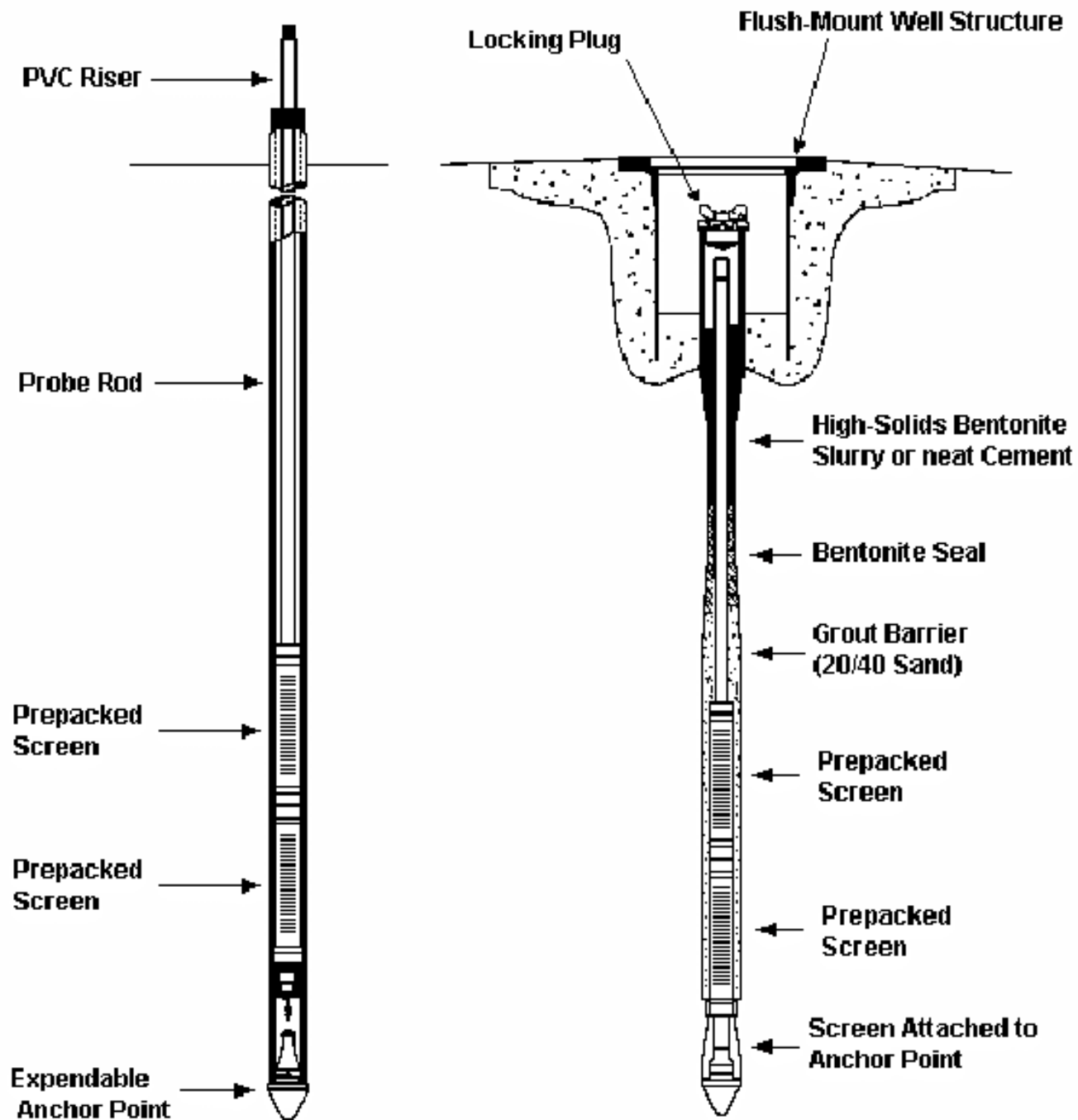
Small Diameter Well can only be designed by a California Registered:

- Geologist or
- Civil Engineer

# Well Design

- Designer must review all available well and boring logs for the site and immediate vicinity.
- Designer must have a very good understanding of the subsurface geology to properly select the:
  - Filter pack
  - Screen size
  - Method of placement - transition seal
  - Method of placement - annual seal





# Soil Description/Sampling

- The subsurface geology must be verified by continuous logging during the installation of small diameter wells.
- Soil descriptions, soil sampling, and documentation of depth to groundwater is required.

# Soil Description/Sampling

Since Direct Push Technology (DPT) does not inherently produce materials that can be logged, you may need to use:

- Continuous logging technique such as continuous coring or
- Cone Penetrometer Test (CPT).

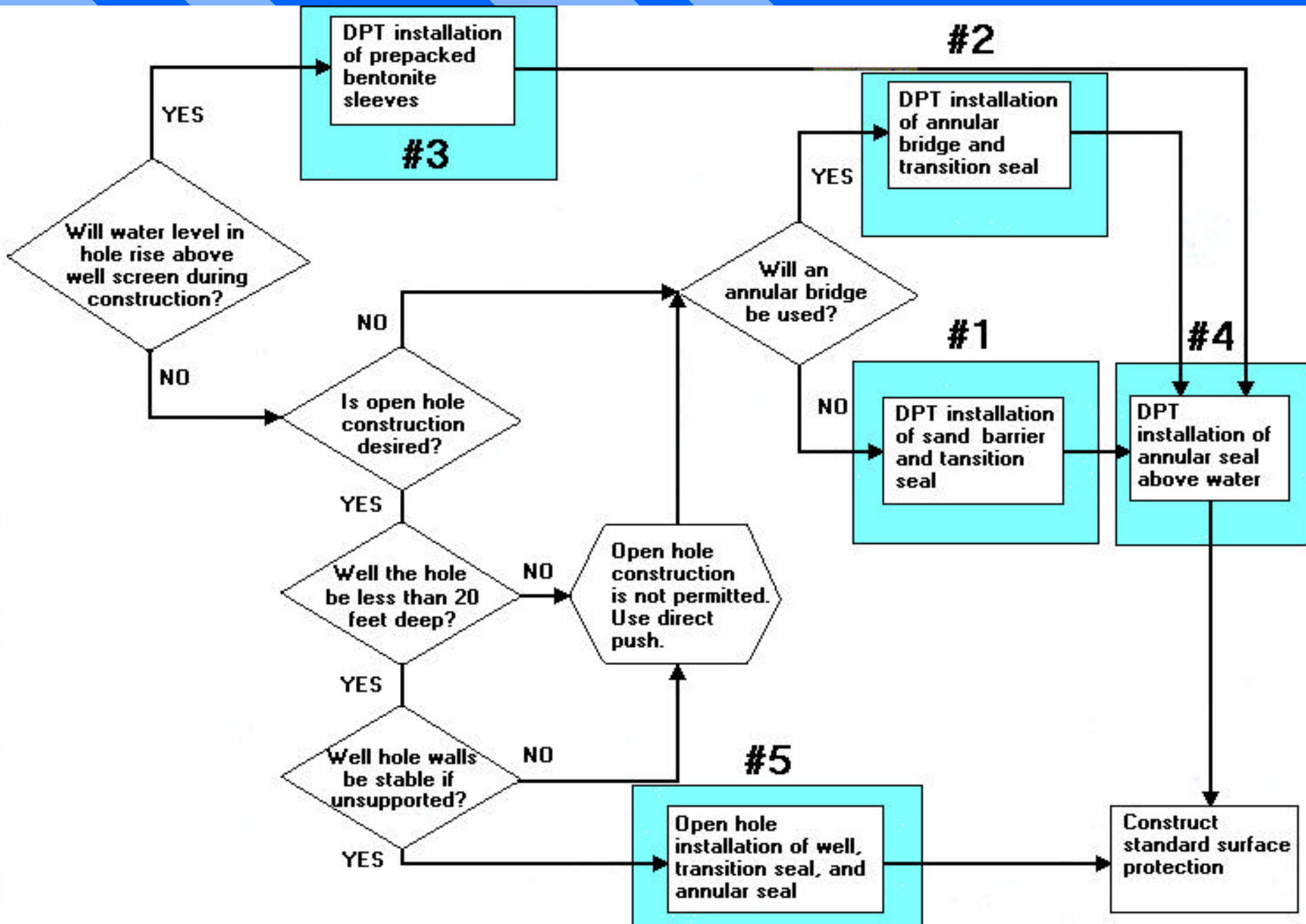
# Soil Description/Sampling

- Depending on the level of information available, the degree of verifiability needed may be reduced on a case-by-case basis with a variance issued by DEH.
- The geology and water table must be depicted on all well logs submitted. The source of the geologic data (continuous coring, CPT, etc.) shall be clearly stated on the well log.

# Small Diameter Well Construction Guidelines

## Five separate procedures

- #1 Sand barrier and transition seal.
- #2 Annular bridge and transition seal.
- #3 Prepacked bentonite sleeves below water level in the borehole.
- #4 Annular seal above water level in well.
- #5 Open hole installation - transition and annular seal.



# **Procedure #1**

## **Sand barrier and transition seal.**

- Prepacked well screen that spans the water surface during construction.
- Sand barrier filling the annular space adjacent to the prepacked well screen.
- Sand barrier extending to 6 in. above the top of the screen.
- Transition seal 6 in. thick of properly hydrated granular bentonite above sand barrier.
- The annular space from the top of the bentonite transition seal to the base of the surface seal shall be filled using procedure #4.







## **Procedure #2**

### **Annular bridge and transition seal.**

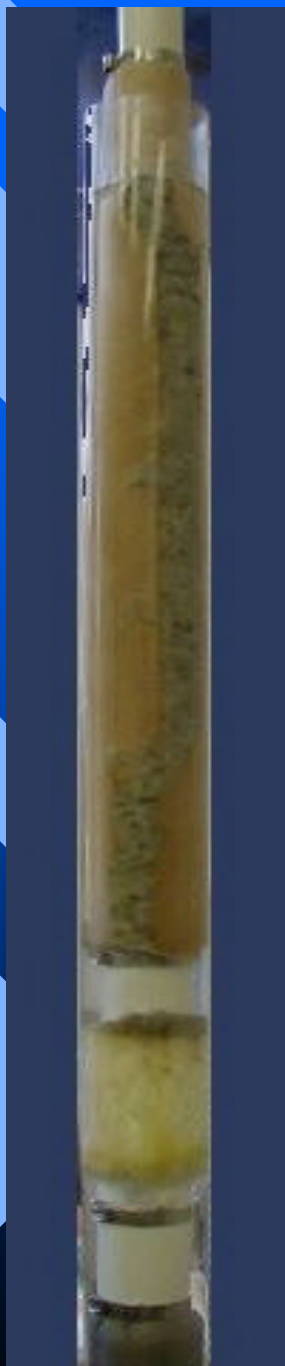
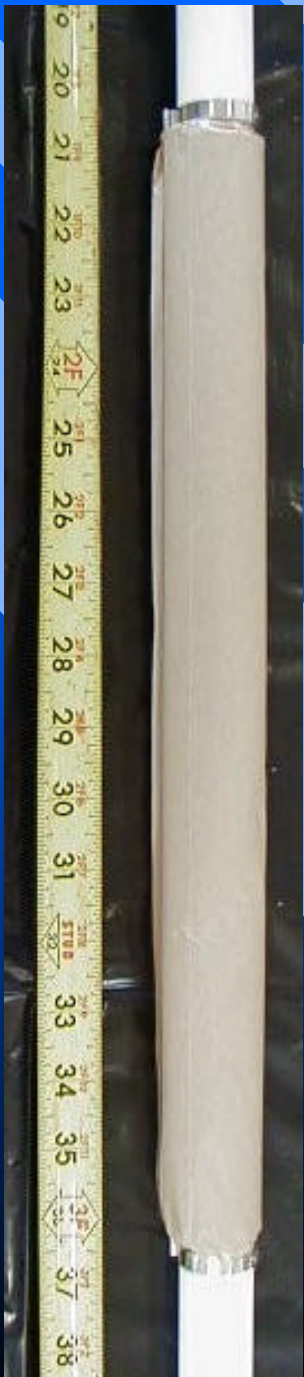
- Prepacked well screen that spans the water surface during construction.
- Using a manufactured device to bridge the annular space (i.e. an “annular bridge”, “foam bridge”).
- Transition seal 6 in. thick of properly hydrated granular bentonite above sand barrier.
- The annular space from the top of the bentonite transition seal to the base of the surface seal shall be filled using procedure #4.



# Procedure #3

## Prepacked bentonite sleeves below water level in the borehole

- Prepacked well screen that is completely below the water surface.
- Properly installed prepacked bentonite seal for all riser pipe installed beneath the water level in the borehole at the time of installation.
- The annular space above the water table from the top of the prepack bentonite seal to the base of the surface seal shall be filled using procedure #4.



**Note:** The use of pre-packed bentonite seals for transition or annular seals above the water level is not allowed.

# **Procedure #4**

## **Annular seal above water level in well.**

- The annular seal shall be filled using approved sealing materials and methods as specified in Appendix B.IV. B.
- Calculate the amount of grout expected for each foot of annulus that will be filled. Mix an appropriate amount of grout material and place it in the hopper on the grouting machine.
- Position the grout tube just above the bentonite transition seal.
- Retract two push rods at a time while simultaneously pumping grouting.

# **Procedure #4**

## **Annular seal above water level in well.**

- In retracting the first two rods the grout tube is held down so that the tube bottom is approximately 6 feet below the bottom rod.
- Continue operation until all the push rods have been removed and the grout fills the hole.
- Cut casing approximately 6 inches above ground surface and temporarily cap with slip cap.
- Construct a standard well surface completion in accordance with the specifications in Appendix B.IV. B.

# Procedure #5

## Open hole installation – transition and annular seal.

- This procedure applies to small diameter borings no greater than 20 feet in depth from the ground surface.
- The permit application must include evaluation of site's geologic conditions to justify the use of this method.
  - The subsurface geologic conditions must be evaluated by the qualified professional (as specified in Appendix B.IV.B.).
  - The geologic material must be of a type not given to caving, sloughing, expansion, heaving, flowing, or other characteristics that would cause closure or in-filling of an open borehole.
  - Borehole must remain open during construction of the well.
  - Provide a certification that the site geologic conditions are suitable for open-hole construction of wells.



# Procedure #5

## Open hole installation – transition and annular seal.

- The proper placement of the well casing and annular materials (sand pack, well seal, etc.) and use of an appropriate method for verifying placement.
- Centralizers must be used at the bottom, top, and at an appropriate location in the middle of the well assembly.

# Well Log Reports

- The well log report shall include all quantities of sealing materials used, these measurement shall be in volume units.
- The well log report shall present the geology and water table. The source of the geologic data (continuous coring, CPT, etc.) shall be clearly stated on the log.
- The well log report shall include a well construction diagram.

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